Crops Committee Final Recommendation for 205.601 March 15, 2006

I. List: 205.601 Synthetic substances allowed for use in organic crop production

II. Category Use

(a). As algicides, disinfectants and sanitizers

III. Committee Summary: Many public comments were received by the NOP supporting the continued allowance of the use of the chlorine materials (calcium hypochlorite, sodium hypochlorite, and chlorine dioxide) in this category. The most common reason given for the continued use was for food safety concerns over the potential contamination of organic produce by food borne pathogens. A big concern is that the negative public reaction to potential outbreaks of illness associated with organically produced food would be catastrophic to the industry. Compliance with FDA and other health regulatory agency regulations and guidelines was another common concern.

Some comments expressed concern about the application of chlorine materials to organic product in excess of the NOP standard listed in the Rule. These comments stated that chlorine concentrations well in excess of the NOP standard are used in some instances with the assumption that the material would be degraded or diluted at some later point in the handling process of the crop or at least before the produce reached the consumer. Two of these comments (from a vegetable sprout producer and a consumer association) specifically stated that the residual chlorine levels in solution must not exceed the NOP Rule guideline at the point at which the treatment solution is drained from the food being treated. The crops committee agrees with the comments that more specific guidelines for the use of chlorine materials in organic crop applications are needed, but the committee also acknowledges that such a recommendation to add further addenda to the regulation is not the purview of this sunset document.

One comment (from a PAA supplier) proposed peracetic acid (PAA), a hydrogen peroxide/acetic acid combination, as a safer alternative disinfectant to chlorine. This comment also acknowledged that PAA is currently not an allowed replacement for some of the chlorine application uses. One comment objected to the use of any synthetics in organic crop production.

Review of the current Technical Evaluation Report supplied to the NOP shows that calcium and sodium hypochlorite, and chlorine dioxide are all synthetic materials not produced from naturally occurring sources or processes. The report states that no information is available from EPA or FDA to suggest that environmental contamination results from the proper manufacture, use, or disposal of calcium or sodium hypochlorite. Contamination from misuse or improper disposal is possible, although these materials are broken down by sunlight to compounds commonly found in air. Release into soil has the potential to release hypochlorite ions which can react with soil organic matter to form carcinogenic trihalomethane compounds (THMs). Sodium and calcium hypochlorite are toxic to freshwater fish and invertebrates. Discharges of hypochlorite wastes from facilities are regulated through issuance of site-specific wastewater discharge permits intended to ensure that no significant adverse effects on such wildlife occur. The effects on wildlife from wastewater discharges should be minimized by the adherence to the Safe Drinking

Water Act limit of 4mg/L. The production of trihalomethanes in the reaction with organic matter in soil or water would also be minimized if the 4 mg/L guideline is followed.

When used as an irrigation system cleanser within the allowed limits, calcium and sodium hypochlorite, and chlorine dioxide would not be expected to have any detrimental effects on soil organisms, crops, or livestock. If misused, sodium hypochlorite may possibly raise soil pH, add sodium, and kill beneficial microorganisms.

The breakdown materials of calcium and sodium hypochlorite are hypochlorous acid and hypochlorite ions which are highly toxic and corrosive. EPA has placed them in Toxicity Category I (indicating the highest degree of acute toxicity) for oral, dermal, eye, and inhalation effects. As stated above, hypochlorite ion, when mixed with organic materials (e.g. humates in soil), forms trihalomethanes(THMs), which are carcinogenic. There is a slightly increased risk of developing bladder or colorectal cancer over a lifetime if THMs are ingested in excess of the current drinking water limits over an extended period of time. The EPA has ruled that the concentrations of THMs in water should be less than 80 parts per billion. Calcium and sodium hypochlorite are highly caustic and are a concern for occupational exposures to concentrated solutions (ASTDR,2002).

Possible toxic effects of chlorine dioxide are that it is a severe respiratory and eye irritant. The reaction products of chlorine dioxide are chlorites and chlorates. The toxic action of ingestion of chlorite is primarily in the form of oxidative damage to red blood cells and also neurodevelopmental effects. An inhalation study showed vascular congestion and lung damage effects(EPA 2000).

Chlorine dioxide, sodium hypochlorite, and calcium hypochlorite are not persistent in the environment. Potential human health effects due to these materials occur dermally or by inhalation. Dermal symptoms range from mild irritation to blistered skin depending on the concentration of the solutions. Inhalation symptoms include nasal irritation, sore throat, coughing, respiratory distress, and lung congestion.

Citric acid or other acids (such as acetic, ascorbic) were mentioned as wholly natural substitute products that could be substituted for the chlorine materials as irrigation line cleaners and equipment sanitizers. No information on the effectiveness of these materials in crop wash water was offered in the report. One commentator offered an example of acetic acid use in the meat industry as a carcass wash for surface sanitation. In this application wash water is amended to pH 3 to attain surface sanitation. Extrapolating this information to crop wash water, maintaining this low of a pH would take substantial and continual additions of acid, which would be corrosive to the handling equipment, the workers in the operation, and the crop as well in many cases (Envirotech).

Other allowed substitute materials listed in the Technical Evaluation Report include hydrogen peroxide, ozone, peracetic acid, various alcohols, copper sulfate, and soap based algicides. Steam sterilization and UV radiation were mentioned as alternative practices that might make the use of chlorine materials unnecessary. Of these materials, the peracetic acid appears to hold the most promise as a safer alternative to chlorine in crop wash water applications. It requires at least a 50

fold lower concentration than hydrogen peroxide for sanitation efficacy in crop wash water, which would eliminate the bleaching (oxidizer) effect problem associated with hydrogen peroxide(EnviroTech). Peracetic acid was recommended for approval for this purpose by a previous NOSB, but has not cleared the NOP rulemaking process as yet. Ozone, as mentioned by the Report, has a strong tendency to off-gas from wash water and causes serious headaches in workers exposed to it. UV light from special lamps has been shown to be effective in some limited applications.

Due to overriding food safety and regulatory issues, the Crops Committee recommends the renewal of these chlorine materials.

IV. Committee Recommendation:

Recommendations based upon comments received- 205.601(a)

The Crops Committee recommends the renewal of the following materials to the use category:

(2) Chlorine Materials – <u>Except</u>, That, residual chlorine materials in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act.

- **(i) Calcium hypochlorite**
- **(ii) Sodium hypochlorite**
- **(iii) Chlorine dioxide**

Moved: Jeff Moyer Second: Kevin Engelbert
Committee vote: 3-0 2 absent (Delgado, Ostiguy) ***Board vote:***